

Claims: 25a/1610

1. A composition for reducing deposition of a mineral salt from an aqueous supersaturated solution onto a solid surface in contact with the aqueous supersaturated solution which composition comprises a dispersion of either (i) seed crystals of the mineral salt in an aqueous solution of the mineral salt or (ii) seed crystals of a salt isomorphous with the mineral salt in an aqueous solution of the isomorphous salt wherein the dispersed seed crystals are of Mean particle size of less than 2.5 microns.
2. A composition as claimed in Claim 1 wherein the mineral salt is selected from the group consisting of alkaline earth metal carbonates and alkaline earth metal sulphates.
3. A composition as claimed in Claims 1 or 2 wherein the seed crystals are of Mean particle size of 0.5 to 2 microns.
4. A composition as claimed in any one of the preceding claims wherein the seed crystals are present in the dispersion in an amount of from 1 to 60% by weight based on the total weight of dispersion.
5. A composition as claimed in any one of the Claims 2 to 4 wherein the seed crystals are barium sulphate crystals and have 3 dimensional distances of length, breadth and thickness, normal to one another, in a ratio of 0.4-1.5:1:0.4-1.5.
6. A composition as claimed in Claim 5 wherein the seed crystals have one or more voids therein which voids occupy 5 to 40% of the volume enclosed by the envelope of the outer surface of the seed crystals.
7. A composition as claimed in any one of claims 2 to 4 wherein the seed crystals are rounded calcium carbonate crystals having a diameter in the range of 1 to 2.5 microns.
8. A method of reducing deposition of mineral salts from an aqueous supersaturated

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solution onto a solid surface in contact with the aqueous supersaturated solution which method comprises:

- 5 (a) forming a composition as claimed in any one of Claims 1 to 7;
(b) distributing said composition into either (i) an aqueous supersaturated solution of the mineral salt or (ii) an aqueous precursor liquid of the aqueous supersaturated solution which aqueous precursor liquid is saturated with respect to the seeds, and in the case of (b)(ii) converting the aqueous precursor liquid into an aqueous supersaturated solution of the mineral salt; and
(c) contacting the treated aqueous supersaturated solution with the solid surface.

10 9. A method as claimed in Claim 8 wherein the composition is obtained by subjecting an aqueous supersaturated solution of either (i) the mineral salt or (ii) a salt isomorphous with the mineral salt to sonic or ultrasonic vibration.

10 10. A method as claimed in Claim 9 wherein the seed crystals have 0.025 - 0.5 times the diameter of crystals of the same mineral salt which crystallise out from an aqueous supersaturated solution thereof in the absence of sonic or ultrasonic vibration.

15 11. A method as claimed in Claims 9 or 10 wherein the frequency of the ultrasonic vibration is between 16 and 40kHz.

20 12. A method as claimed in Claim 11 wherein the energy density applied to the aqueous supersaturated solution by the ultrasonic vibration is in the range of from 1 to 100 J/cm³.

13. A method as claimed in any one of Claims 9 to 12 wherein the duration of the applied ultrasonic vibration is 0.05 to 360 seconds.

25 14. A method as claimed in any one of Claims 9 to 13 wherein the degree of supersaturation of the aqueous supersaturated solution which is subjected to the ultrasonic vibration is 50 to 400 times over the saturation level.

30 15. A method as claimed in any one of Claims 9 to 14 wherein the supersaturated solution which subjected to the ultrasonic vibration is obtained by passing 2 or more aqueous solutions of the separate components of the mineral salt or of the separate components of the isomorphous salt to a locus of mixing, at which locus the aqueous supersaturated solution is formed and the ultrasonic vibration is applied.

16. A method as claimed in any one of Claims 8 to 15 wherein the percentage weight of seed crystals from the dispersion to the total weight of seed crystals and depositable

mineral salts is in the range 10 to 50% w/w.

17. A method as claimed in any one of Claims 8 to 16 wherein distribution of the composition into the aqueous supersaturated solution or aqueous precursor liquid is performed 2 to 4 times with the distribution steps being in series or parallel or a combination of both.

18. A method as claimed in any one of Claims 8 to 17 wherein the aqueous precursor liquid is converted into an aqueous supersaturated solution of the mineral salt by (i) cooling and/or reducing the pressure of the aqueous precursor liquid or (ii) by adding a complementary ion to the precursor liquid.

19. An apparatus for effecting controlled mineral salt deposition, which comprises: a crystal seed generator chamber, having an inlet for an aqueous supersaturated solution or a first inlet for a first aqueous precursor liquid of the aqueous supersaturated solution and a second inlet for a second aqueous precursor liquid of the aqueous supersaturated solution, a means for creating cavitation in a solution in said chamber to effect crystallisation, and an outlet for a dispersion of seed crystals, a line for said dispersion leading from said crystal seed generator chamber to a mixing chamber which mixing chamber has a first inlet for said dispersion, a second inlet for an aqueous supersaturated solution or aqueous precursor liquid thereof, a mixing means, and an outlet.

20. An apparatus as claimed in Claim 19 wherein a plurality of crystals seed generator chambers are connected in series or in parallel.

21. An apparatus as claimed in Claim 20 wherein the plurality of crystal seed generator chambers which are connected in parallel are each connected to a further crystal seed generator chamber.

22. An apparatus as claimed in any one of Claims 19 to 21 in which the apparatus has a first line for the aqueous supersaturated solution leading to the mixing chamber and a side line from the first line leading to the crystal seed generator chamber(s).

23. An apparatus as claimed in any one of Claims 19 to 21 in which the apparatus further comprises:

a first line for the first aqueous precursor liquid leading to the mixing chamber and a side line from the first line leading to the crystal seed generator chamber(s),

a second line for the second aqueous precursor liquid leading to the mixing chamber, and a side line from the second line leading to the crystal seed generator

chamber(s).

24. An apparatus as claimed in any one of Claims 19 to 23 which additionally comprises a means for monitoring the size of the seed crystals.

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